A.D. 1875, 28th May. N° 1954.

SPECIFICATION

OF

JOSEPH JAMES COLEMAN.

TREATING SEWAGE.

LONDON:
PRINTED BY GEORGE E EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
PUBLISHED AT THE GREAT SEAL PATENT OFFICE,
25, SOUTHAMPTON BUILDINGS, HOLBORN.
1875.

A.D. 1875, 28*th May*. N° 1954.

Treating Sewage.

LETTERS PATENT to Joseph James Coleman, of Glasgow, in the County of Lanark, North Britain, Fellow of the Chemical Society, for the Invention of "IMPROVEMENTS IN THE TREATMENT OF THE EXCRETA OF TOWNS."

Sealed the 16th November 1875, and dated the 28th May 1875.

PROVISIONAL SPECIFICATION left by the said Joseph James Coleman at the Office of the Commissioners of Patents, with his Petition, on the 28th May 1875.

I, JOSEPH JAMES COLEMAN, of Glasgow, in the County of Lanark, North Britain, Fellow of the Chemical Society, do hereby declare the nature of the said Invention of "IMPROVEMENTS IN THE TREATMENT OF THE EXCRETA OF TOWNS," to be as follows, that is to say :—

The excreta of towns which are removed by water carriage in the form of sewage I treat as follows :—I filter the sewage through a bed of mineral oil works' spent shale, which not only retains the solid matter, but also deodorizes the liquid portion which percolates through the

shale and prevents the same from subsequently generating injurious gases when mixed with running streams.

In dealing with such portion of the excreta of towns as are not removed by water carriage I cause them to be mixed with disintegrated mineral oil works' spent shale at the residences of the inhabitants by the dry closet system, and also if necessary with a further quantity of crushed mineral oil works' spent shale (either alone or combined with calcic salts) the combined product forming a valuable manure.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Joseph James Coleman in the Great Seal Patent Office on the 26th November 1875.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JOSEPH JAMES COLEMAN, of Glasgow, in the County of Lanark, North Britain, Fellow of the Chemical Society, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-eighth day of May, in the year of our Lord One thousand eight hundred and seventy-five, in the 38th year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Joseph James Coleman, Her special license that I, the said Joseph James Coleman, my executors, administrators, and assigns, or such others as I, the said Joseph James Coleman, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN THE TREATMENT OF THE EXCRETA OF TOWNS," upon the condition (amongst others) that I, the said Joseph James Coleman, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

Coleman's Improvements in Treating Sewage.

NOW KNOW YE, that I, the said Joseph James Coleman, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the accompanying Drawings, and to the letters and figures marked thereon, that is to say:—

My improvements in dealing with the excreta of towns consists in treating the said excreta with the spent shale of mineral oil works in the manner herein-after described.

The spent shale which I employ for the purpose of dealing with the said excreta is the residuum remaining in either the vertical or horizontal retorts of mineral oil works after carbonaceous oil shales, either en masse, or crushed have been distilled therein, either with or without steam, such residuum being at present a waste material and stocked in "waste heaps."

I do not find that it is necessary to the success of my Invention that tar or any substance other than shale should have been distilled in the retorts from which the spent shale is a product. Such spent shale consists chiefly of silica and alumina associated with from 5 to 10 per cent. of finely divided carbon, and having traces of other substances therein such as phosphoric acid, magnesia, and lime, and I use it for treating the excreta of towns in the following manner, or in manner substantially the same.

I treat the fluid or semi-fluid excreta of towns removed by water carriage and commonly called sewage in the following manner:—I filter the sewage through a bed or layer of the aforesaid spent shale of mineral oil works, by which means the fluid or semi-fluid sewage is purified or deodorized sufficiently to be fit to run into streams of water.

I now proceed to describe methods by which the sewage of towns may be purified by filtration through the spent shale of mineral oil works as follows:—At a point some distance from the sewage works I introduce into the main sewer the aforesaid spent shale in a ground or finely divided state, a sufficient fall being allowed to cause an intimate mixture of the shale with the sewage by the motion of the mass. By this means the sewage is fairly deodorized upon its arrival at the outfall. I then allow the sewage to subside in tanks for some time, or not

less than one hour, during which time the sewage mud (which would otherwise clog the filters) combined with the spent shale powder falls to the bottom of the tanks.

The supernatant liquid partially purified I allow to overflow on to filters of coarse spent shale, that is to say, in lumps, or not finely divided, by which means the purification is completed.

I remove the mud periodically from the bottoms of the tanks, the process or treatment herein-before described having produced it in an innocuous condition, and I then dry the mud for manure, or otherwise dispose of it.

On the Sheet of Drawings hereunto appended is shown an arrangement of apparatus for carrying out this part of my Invention.

In the Drawings Figure 1 is a plan; Figure 2, a section on the line *a*, *a*, Figure 1; and Figure 3, a section on the line *b*, *b*, Figure 1.

At the point A, or at any other suitable position, is placed a pan mill or other mechanism for grinding the aforesaid spent shale to powder. The sewer, marked B, is the outfall, and from it there branch out a number of smaller sewers or channels C leading to the tanks D. Disintegrated or pulverized spent shale is introduced into the sewer B, and mixing with the liquid or semi-liquid sewage therein is carried to the discharge valves, placed at any desired intervals but not shown on the Drawings, in those parts of the pipes or channels C which are situated over or above the settling tanks D.

When the tanks D have been filled with sewage in the manner described, the liquid is allowed to overflow the sides of the tanks opposite to that at which it entered and percolate through the beds of coarse spent shale constituting the banks F at the side of each tank, the liquor is thus further purified, and running into the gutters G becomes, if desired, still further purified by percolating or filtering through the further beds of spent shale, marked H, preferably by running along the gutters formed in the upper part of each side thereof, and percolating through the larger or wider portion of the ridges below out of the spaces, between which it runs off to any desired exit, as purified water.

Coleman's Improvements in Treating Sewage.

When a sufficient deposit of sewage has been in the tank this is shovelled out into trucks which are drawn up on the line of rails at the side thereof, as shown at *x* in the plan, Figure 1, and section, Figure 2, turntables I being provided for travelling the trucks as required.

Another method of carrying out my process with fluid or semi-fluid spent shale is to select a sandy tract on the banks of a stream or river, or within convenient distance of such, and to mix the aforesaid spent shale with the sewage, as herein-before described, and then to allow the mixed sewage and spent shale to gradually spread itself over the sandy tract, by which the purifying material can be evenly diffused over a great extent of surface, and from time to time ploughed or dug in, or otherwise treated, so as to form a soil capable of cultivation or otherwise.

Although preferring to employ the spent shale introduced in the state of powder into the sewage itself before its outfall, this process may be modified by merely preparing large tracts of sand or sandy soil for the purification of sewage by top dressing them with the spent shale in suitable mechanical condition so as to avoid the waterlogging of any portion of the surface.

Upward or downward filtration may be resorted to in place of the process herein-before described in dealing with the sewage. Precautions being taken to use the spent shale coarse, and to replace it periodically when saturated with sewage mud.

In dealing with the sewage of towns on the dry system I treat the semi-solid excreta deposited in dry closets, public, and other privies, slaughter houses, and cesspools, by mixing such semi-solid excreta with the spent shale of mineral oil works, previously ground to powder or coarse grains in a grinding mill or get into the state of coarse powder by other mechanical means preferably in the proportion of equal parts of the ground spent shale and semi-solid excreta, but a less proportion of the latter may be used, and if, when used for dry closets of private houses, such ground spent shale be found dusty I combine with it a small quantity of a deliquescent salt, such as chloride of calcium, such addition, however, not being absolutely necessary.

During the admixture of the excreta with the ground mineral oil works' spent shale the mass gradually becomes deodorized and inoffensive, and I then remove the mixed mass without nuisance to the

neighbourhood or the carriers employed in removal, to be disposed of as manure or otherwise.

Having now described and particularly ascertained the nature of my said Invention, and the system, mode, or manner in or under which the same is or may be used, or practically carried into effect, I would observe in conclusion that what I consider to be novel and original, and therefore claim as the Invention secured to me by the herein-before in part recited Letters Patent is, the treatment of the excreta of towns with mineral oil works' spent shale, in either manner substantially as herein-before described.

In witness whereof, I, the said Joseph James Coleman, have hereunto set my hand and seal, this Twenty-fourth day of November, One thousand eight hundred and seventy-five.

JOSEPH JAMES COLEMAN. (L.S.)

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1875.